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ABSTRACT

Over the years, teacher questions have consistently aimed at literal comprehension, indicating that teachers lack understanding of the reading-thinking-questioning hierarchy. Benjamin Bloom's "Cognitive Taxonomy" can serve as a hierarchical framework for the design of questions. Within this framework, a teacher can confront decision making in a sophisticated manner and design powerful reading comprehension activities. Five questions a teacher must consider relative to the style and content of the text and to the nature of the learner are: In examining the selection, are there problems with style that may impede understanding of the lowest levels of content, identified by Bloom as knowledge and translation? To what extent does the selection content enable the teacher to expand the cognitive levels of questioning so as to go beyond the memory level of reading comprehension? How can the instructional planner diversify the questions that guide reading comprehension so as to incorporate higher cognitive levels? How does a cognitive ordering of questions affect the way the reader processes the reading material? What kind of affective "side-effects" are aroused by the nature of the questions, and how do they influence the readers' attitude toward reading? (TJ)

Title: Beyond Recall in Reading Comprehension:

Five Key Planning Decisions

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Beyond Recall in Reading Comprehension: Five Key Planning Decisions

What are the decisions that a teacher of reading must make to promote reading comprehension? If the purpose is to maximize the development of thought processes through reading comprehension, the teacher's strategies must be far more sophisticated than if the intent is only for an assessment of the pupil's reading comprehension. Simply stated, the teacher's planning decisions regulate the outcomes of reading comprehension.

From the very beginning stages of reading, children should be directed towards patterns of comprehension and critical thinking through classroom discussion and stimulating questions (Spache and Spache, 1973). Furthermore, the levels of questioning and questioning strategies used by the teachers have primary importance in the way that students learn to think about reading (Zintz, 1975). It has been shown that the manner of presentation of questions, even those a reader is conditioned to anticipate in silent reading, can influence a reader's comprehension strategies (Rothkopf, 1968). Thus, the parameters established by the teacher through questioning style set the mental operations students will be asked to perform, the points they explore, and the modes of thought they learn (Taba, et al, 1964).

Research since the turn of the century has consistently shown that teacher questions have been used primarily for one purpose; recall of factual data (Gall, 1970). Guszak concluded from one reading study in which 70.4 percent of all questions asked aimed for literal comprehension, that teachers lack understanding of the reading - thinking - questioning hierarchy (1967). Throughout one's formal schooling,

it appears that learners have been exposed to a kind of conditioning inherent in the "quiz game" approach to reading comprehension that characterizes typical questioning procedures. Restrictive questioning strategies promulgate several fallacies for both teachers and students, such as:

(1) that most questions have <u>one</u>, correct answer:

(2) that recall of information is the sum and substance of reading comprehension; and, moreover,

(3) that when teachers formulate questions to test the student's recall of what they have read, they have completed the task of using a reading selection to facilitate reading comprehension. Productive thinking about the author's ideas has been neglected in exchange for being right and for gaining teacher acceptance.

The teachers' focusing of questions for the singular purpose of recall in reading ignores the nature of cognitive functions which include more complex levels of thinking and learning. Hunkins (1973), for one, sees questions suitable for four possible functions; centering, expansion, distribution, and ordering. Sanders (1966) views classroom questions as a means for enabling pupils to <u>use</u> ideas as well as for remembering them. Questions according to Taba (1971) are a means of achieving two critical goals; for developing thinking skills and for promoting autonomous thinking in pupils. Suchman (1966) proposed that questioning strategies are the key to inquiry learning enabling students to know <u>what</u>, <u>how</u>, and <u>why</u> they know something.

Bloom's Cognitive Taxonomy has been identified as a comprehensive framework for the design of questions (Hunkins, 1973; Sanders, 1966; Rogers, 1972). This framework is hierarchical (higher levels subsume lower ones) and it consists of six broad classes that are further defined through subclasses. The major classes are presented in excerpted form below (Bloom, et al 1956):

> KNOWLEDGE. Involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting.
>
> COMPREHENSION. Refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications.
>
> APPLICATION. Includes the use of abstractions in particular and concrete situations.
>
> ANALYSIS. Involves the breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas are made explicit.
>
> SYNTHESIS. Requires the putting together of elements and parts so as to form a whole.
>
> EVALUATION. Elicits judgements about the value of material for given purposes.

Armed with knowledge of this framework, the teacher-planner can confront decision making in a sophisticated manner and is able to design more powerful reading comprehension activities. Decisions are made relative to style and content of the text and to the nature of the learners. The following selection will serve as an example in which the five resultant decisions are contemplated by the teacher-

planner.

> All warm-blooded animals are very helpless at first. Young birds and young bats must be taught to fly. Thousands of young seals drown every year. They never learn to swim "naturally." The mother has to take them out under her flipper and show them how. Birds sing without instruction; however, they do not sing well unless they are able to hear older members of their species. Older harvest mice build better nests than beginners. Frank Buck says that the young elephant does not seem to know at first what his trunk is for. It gets in his way and seems more of a hindrance than a help until his parents show him what to do with it. Insects seem to start life equipped with all necessary reflexes, but they seem to improve their talents with practice. Young spiders, for example, begin by making quite primitive little webs. They attain perfection in their art only after much time. Older spiders, if deprived of their spinnerets, will take to hunting. (Firioux, 1974).

DECISION #1: IN EXAMINING THE SELECTION, ARE THERE PROBLEMS WITH STYLE THAT MAY IMPEDE UNDERSTANDING OF THE LOWEST LEVELS OF CONTENT, WHICH ARE IDENTIFIED BY BLOOM AS KNOWLEDGE AND TRANSLATION?

Content refers to information and ideas, whereas style reflects how these are presented to the reader. Initial analysis of style may indicate that linguistic structures are present which could hinder transcending even the basic levels of understanding. Content itself can be difficult dependent upon the abstraction of the idea presented and the level of vocabulary used to explain and describe the idea. Content may become even less accessible when style of written formal English is beyond the linguistic experience of the reader, and, by the same token, a change of style can make ideas embedded in the content readily understandable. Research has shown that some transformations appear to be more easily comprehended than others, (Coleman, 1964 and 1965). Shifts in understanding style

and levels of discourse change with stages of human development, (Moffett, 1968). Particular modes and syntactic structures of writing become more complex for children to understand when the experiences recounted in the writing become farther removed from the actual cognitive, linguistic abilities of the children.

The key to helping students understand sentence relationships would be to help them locate the kernel idea. Understanding the meaning of a sentence partially rests on recognizing relationships established among four basic structural types (Francis, 1958). By reducing difficulty embedded in one or a combination of syntactic structures, greater literal comprehension would be achieved and the reader would be better able to translate the author's idea into his own. The kernel idea in a larger sentence would be carried by those words in the basic sentence pattern that contained the central meaning and which could stand alone to complete the intrinsic thought. This training assists students in focusing on the main idea and eliminating irrelevant information.

Teachers would evaluate style by asking themselves, "Are there structures (transformations) within the reading selection that are beyond the spoken discourse level of particular students which may impede understanding of content?" The teacher may then need to help students disentangle ideas in complicated sentences by reducing them to core elements that reflect spoken discourse patterns. While Dawkins (1975) has listed twelve basic sentence patterns of English, these patterns can become more complex with particular

grammatical operations and transformations.

Types of syntactical operations such as irregular word order, combinations of sentence parts, and deleted and substituted elements, may cause content interference for students as they attempt to process the literal meaning. When irregular word order occurs, the unfamiliar sequence of that sentence arrangement interferes with the reader's processing of ideas. Combined sentence arrangements may present an unknown level of abstraction. When words are deleted in the latter part of a sentence or in a subsequent sentence, the reader has to infer the antecedent meaning. When words are substituted for others, the reader has to know which words are referred to by the substituted elements.

Decision #1 may be applied with the following grammatical examples in the reading selection:

Example #1: Deleted words.
Text: The mother has to take them out under her flipper and show them how.

At the translation level, the reader must be made aware that the meaning of the word "how" is derived from the immediate referent sentence. Further complication in meaning arises since the interpretation of both these sentences is contingent upon recall of information in the sentence that precedes both of these. At a higher cognitive level, all three sentences unite in meaning to reinforce the main idea stated in the opening sentence.

Example #2: Substituted Elements.
Text: It gets in his way and seems more of a hindrance than a help until his parents show him what to do with it.

The reader must know that the word "it" in both instances clearly refers back to the elephant's trunk, and th the pronouns "his" and "him" are also substitutes for the word elephant.

Example #3: Combined sentence arrangements.
Text: Older spiders, if deprived of their spinnerets, will take to hunting.

At the content level, the words "deprived" and "spinneret" contain meaning essential for understanding the causal idea contained in the dependent clause, "if deprived of their spinnerets." At the syntactic level, the reader must hold the causal condition in his mind and not understand its implications until he reaches the last word of the kernel idea, "hunting."

DECISION #2: TO WHAT EXTENT DOES THE SELECTION CONTENT ENABLE THE TEACHER TO EXPAND THE COGNITIVE LEVELS OF QUESTIONING SO AS TO GO BEYOND THE MEMORY LEVEL OF READING COMPREHENSION?

Typically, questions used in reading instruction focus on lower cognitive levels; knowledge and comprehension. Why do these levels of questions dominate both materials and methodology? It may be that the selection itself is weak in terms of high cognitive potential. For example, it would be quite challenging to formulate analysis and synthesis questions for primer reading selections. However, the formulation of lower cognitive questions (knowledge and comprehension) is a much easier task than formulating higher cognitive

questions (application, analysis, synthesis, and evaluation). This may help to explain why lower cognitive types dominate questions used in reading and in other instructional areas.

In examining the cognitive responses to various questioning levels, it is apparent that the higher level question engaged respondents in advanced thinking activities, both creative and critical. In 1960 the Educational Policies Commission identified the development of critical thinking skills as the main goal of educational instruction. Perhaps more systematic use of higher cognitive questions could contribute to the realization of this goal. Therefore, it can be argued that those responsible for curriculum development and implementation should endeavor to infuse instruction with higher cognitive types beginning in the primary grades. This may necessitate careful scrutiny of reading materials with the teacher-planner being more selective so as to choose at least some selections that will make possible the development of questions at <u>all</u> of the cognitive levels.

DECISION #3: HOW CAN THE INSTRUCTIONAL-PLANNER DIVERSIFY THE QUESTIONS THAT GUIDE READING COMPREHENSION SO AS TO INCORPORATE HIGHER COGNITIVE LEVELS?

The authors advocate the use of Bloom's <u>Cognitive Taxonomy</u> as the conceptual framework for question planning. In their experiences in preservice and inservice teacher-training, they have found the following three-step procedure effective in promoting the teacher's facility for using Bloom's schema in question design:

(1) Development of knowledge of Bloom's Cognitive Taxonomy through exposure to the literature, (Hunkins, 1970; Sanders, 1966) training in a minicourse (Borg, 1970), or completion of a specially designed self-instructional module (Merwin and Schneider, 1973; Annacone, 1976).

(2) Practice in applying the Taxonomy in identifying questions according to the various levels. Actual transcripts made from classroom discussions as well as review of questions that appear on tests, in reading texts, etc., have proven useful for this purpose.

(3) Actual lesson planning whereby the teacher applies the conceptual knowledge of Bloom's schema to the formulation of questions, purposely devising a certain number from all levels.

The following questions are offered as examples of how higher cognitive levels as well as lower cognitive level questions can be designed from a reading selection. They are based on the sample selection found on page 4. The reader should bear in mind that the terminology used in the questions themselves should be adjusted in accordance with the reading level of the pupils.

KNOWLEDGE

1. Do older or younger spiders spin more perfect webs? (Knowledge of specifics).
2. On the basis of the information given in the above selection, it is safe to say that before many warm-blooded animals become "skilled" they
   a. must mature in size and age
   b. must learn from their parents

c. must practice
d. all of these
e. none of these
(Knowledge of criteria).

COMPREHENSION

3. Draw a scene which would show a young seal on the way to a swimming lesson.
(Translation type-students required to change written communication to pictorial communication).

4. Flying is to birds as _____ is to seals.
(Interpretation type-students asked to make an analogy on a common-sense level).

5. Compare the young elephant's inability to use his trunk with an infant's inability to walk.
(Extrapolation type-students are asked to go beyond basic information and make an inference).

APPLICATION

6. Using what you learned about baby seals, how would you solve the problem of teaching an orphaned seal to swim? (Notice the similarity between this and synthesis types).

ANALYSIS

7. List all the sentences separately that comprise the above selection. Next to each sentence, write F if it is supported with facts and A if it is an assumption unsupported by facts. (Analysis of Elements).

8. In a subsequent paragraph, the author of the above selection has written that the animal young are alike in more ways than they are different. Analyze the strength of this assertion in light of the information contained in the above selection. (Analysis of Relationships-students are asked to relate various elements to each other).

9. Make up an appropriate title for the above selection.
(Analysis of Organizational Principles - The question is concerned with the selection as a whole).

SYNTHESIS

10. Work as a group to make up a skit about a young elephant who doesn't know what his trunk is for, but through trial and error finds out.
(Students are asked to produce a unique communication).

11. Design a controlled experiment in which you will test the hypothesis that when spiders are deprived of their spinnerets they will take to hunting.
(Students are asked to produce a plan).

12. On the basis of this statement from the selection, "Birds sing without instruction; however, they do not sing well unless they are able to hear older members of their species," devise a testable hypothesis about hearing in birds.
(Students are asked to derive an abstract relationship from the data presented).

EVALUATION

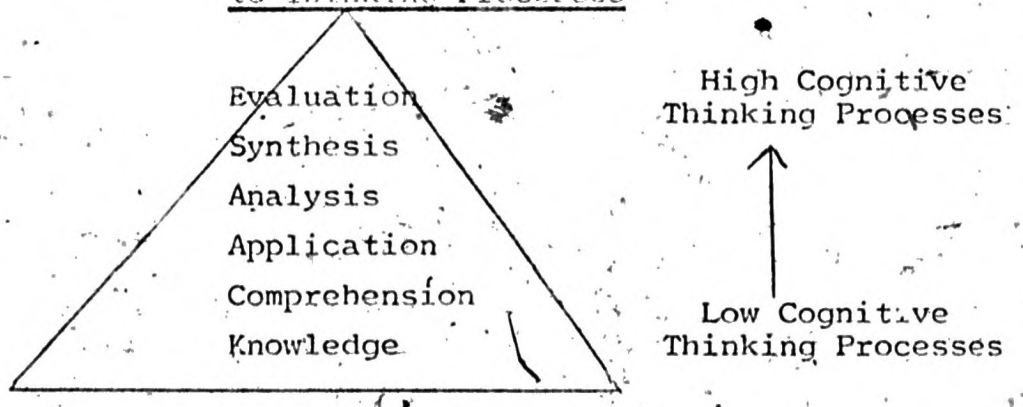
13. Examine the topic sentence for the selection. How would you judge its validity in lieu of the remaining information in the selection?
(Students are asked to make a judgment on the basis of internal evidence (e.g., internal consistency).

14. Examine the topic sentence. Compare it with additional information you have about the warm blooded animals mentioned in the selection as well as other warm blooded animals not mentioned. How valid is the topic sentence?
(Students are asked to make a judgment on the basis of external evidence. (e.g., from other scientific writings, etc.)

DECISION #4: HOW DOES A COGNITIVE ORDERING OF QUESTIONS AFFECT THE WAY THE READER PROCESSES THE READING MATERIAL?

Figure 1. depicts Bloom's Cognitive Taxonomy and its relationships to lower and higher cognitive thought processes.

Figure 1: Bloom's Cognitive Taxonomy and Relationship to Thinking Processes



Using this hierarchial taxonomy as a model, there appear to be two options related to this decision:

1. Order the questions beginning with lower cognitive levels and expand them upward gradually through the higher levels. This option should probably be exercised when the readers have limited vocabularies, a lack of experiential background with the content, or, if in prior encounters with students, the teacher has determined that a preliminary organizing of factual data is needed to generate discussion at higher cognitive levels.

   For example, synthesis question 11 requires the student to design an experiment and test the hypothesis that when spiders are deprived of their spinnerets they will take to hunting. The reading instructor may have fielded similar questions and discerned that students were unable to internalize the cognitive leaps (from low cognitive to high cognitive) needed to synthesize the information into the production of a plan. The readers may need more experiences in first verifying the lower cognitive base before they are able to respond to the higher cognitive questions.

2. Begin discussions, written exercises, and other reading comprehension activities with higher cognitive questions. This option can be selected with readers whose experiential background enables them to begin thought processes from higher cognitive levels because they possess the lower cognitive information at the outset of the reading activities. Referring back to our sample selection, if readers

have knowledge of the warm-blooded animals described therein and possess a working vocabulary so that such essential terminology as "hindrance," "equipped," "reflexes," etc. poses little or no difficulty, then the presentation of higher cognitive questions used to initiate reading comprehension activities would appear a more feasible plan than if the reader did not possess this entry level knowledge.

It was reported earlier that research has consistently shown that lower cognitive questions dominate instructional strategies. It may be that students undergo a kind of conditioning through exposure to questioning strategies that elicit responses only at the knowledge and comprehension levels. When higher cognitive questions are suddenly used to initiate reading-study activities, the reader may react with some degree of uncertainty because of this unfamiliar approach to questioning procedures. One suggestion for making the transition to using higher cognitive questions is to initiate questioning sequences with intermediary types such as application or analysis questions. In order to respond to these types of questions the reader frequently must make direct reference to the factual data in the selection. Thus, the use of these intermediary level questions may help bridge the transition to using even higher cognitive questions in initiating discussions or for other reading comprehension activities. For example, application question 6

requires the reader to justify a plan of teaching an orphaned seal to swim by bringing forth aspects of the content (factual data) that would validate the response.

DECISION #5: WHAT KIND OF AFFECTIVE "SIDE-EFFECTS" ARE AROUSED BY THE NATURE OF QUESTIONS, AND HOW DO THEY INFLUENCE THE READER'S ATTITUDE TOWARD READING?

This decision is related to the human or psychological impact of questions used in reading comprehension activities. The way the student feels about the question and the way the question makes the student feel (affective considerations), can influence the response to the question. Furthermore, since questioning is a pervasive activity in the daily lives of students, it is likely that there is a long-term effect upon the student attitude toward reading in general.

When questions are used solely for assessing the factual dimensions of a selection, reading can be construed to be a kind of quiz game with the teacher in the role of quizmaster and the students the contestants. Over time, students may come to believe that the purpose of reading is to assimilate factual information with little or no regard for analysis of ideas, applying them to reality, or critically examining their implications. Recall of facts becomes an end in and of itself instead of serving as a foundation for expansion of intellectual activities. This syndrome is apparently reinforced in the other subject matter areas (Gall, 1970).

Reading teachers should be sensitive to the affective element contained in cognitive questions. To illustrate, consider Knowledge question #1 for the sample selection: "Do older or younger spiders

spin more perfect webs?" A typical "side-effect" aroused by the nature of this question is fear, anxiety, and threat especially if the reader does not recall the needed information. Another typical affective response for the reader who <u>does</u> recall the information is feelings of self-satisfaction and smugness. It is obvious that the way the teacher poses this type of question and the manner in which the teacher responds to the student's response (both those who do remember and those who don't) will have a residual affect on the reader that will carry over into future reading lessons.

Now let us examine the affective "side-effects" which may be evoked by a higher cognitive question, Analysis question #9 written for the sample selection. This question asks the reader to make up an appropriate title for the selection. Since the question has the potential of a variety of answers it is likely that the element of fear of not knowing <u>the</u> correct answer has been reduced. In order to respond in a logical manner, that is to make up a title that does fit the theme of the selection, the reader must now <u>use</u> the factual data. This kind of higher cognitive question enables the teacher to react with more flexibility to a variety of responses since the question does not require a singular, correct answer. Flexibility in teacher reaction to responses allows more students to be "right." Thus, it may be that inclusion of certain high cognitive questions in reading comprehension activities not only engages the reader in creative and critical thinking activities, but also may promote positive attitudes toward reading. The student's chances for success in answering questions has been increased.

Decision #5 asks that the teacher-planner be alert to both the cognitive element of the question and to the student feelings evoked by the nature of the question. The development of positive attitudes toward reading and the utilization of all levels of human intellect are seen as concomitant goals central to reading comprehension. If the teacher of reading subscribes to these goals, then he or she will make the effort to diversify the levels of cognitive questions while at the same time diagnosing existing student attitudes through analysis of response patterns. The five key planning decisions enable the teacher of reading to enrich and expand intellectual activity through the medium of reading comprehension.

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